[redacted] THIS DOCUMENT CONSISTS OF 7 PAGE(S)
NO. 8 OF 51 SERIES A

DELETED VERSION ONLY

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UNIVERSITY OF CALIFORNIA

RADIATION LABORATORY
P.O. BOX 808
LIVERMORE, CALIFORNIA

December 18, 1953

~~AUTHENTICATED Dec 17 1953~~
~~U.S. ATOMIC ENERGY COMMISSION~~
~~BY [signature] for J.J. Flaherty~~
~~DOCUMENT NO. CXXII- 12-8A~~

Mr. J. J. Flaherty, Manager
San Francisco Operations Office
U. S. Atomic Energy Commission
200 Bush Street
San Francisco, California

Dear Mr. Flaherty:

The following is the proposed technical program of the DMA supported part of the University of California Radiation Laboratory for the period covering the calendar year 1954 and the fiscal year 1955. Figures in parentheses after each major heading give the approximate percentage of the direct technical personnel involved in each sub-program.

I. LABORATORY BUILDUP (3%)

Laboratory buildup still occupies a portion of the experienced scientists' time, working in cooperation with plant engineering and personnel. Many of the projects described below depend on facilities yet to be constructed.

II. FUNDAMENTAL RESEARCH (15%)

A. Experimental and Theoretical Nuclear Physics

This is a broad field of research being concerned largely with neutron physics and including measurement of scattering cross sections, inelastic cross sections, and various reaction cross sections in light elements (fuels), heavy elements (secondary reactions in tamper material), and medium elements (of interest in diagnostic work); some charged particle reactions of general interest are also being investigated.

B. Magnetohydrodynamics

Research in this field is at present largely theoretical and has as its objective understanding the interaction of plasmas with magnetic fields with particular application to the controlled thermonuclear reactor program.

C. Radiochemistry

Fundamental research in this field involves investigations of the properties of fission products and the distribution of fission products as produced by various energies of neutrons and research in the chemical and nuclear

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BY AUTHORITY OF DOE/OC
Carl Wilson 5/23/84
REVIEWED BY DATE
J Diaz 8/7/85

[redacted]

V. THERMONUCLEAR WEAPONS RESEARCH (20%)

A. DELETED

DELETED The device has been designed so as to give information concerning how this type of implosion geometry works. (Reference Document Number CXXII-6)

Design and fabrication of DELETED is complete. Final assembly and firing will take place in Operation Castle.

B. DELETED

DELETED It is intended to be the prototype of a family of weapons using the same implosion system.

Design and fabrication of DELETED is complete. Final assembly and firing will take place in Operation Castle.

C. Equilibrium Reactions

Theoretical investigation of the burning of various fuel combinations in various geometries will be continued.

D. Experimental Investigation of Equilibrium Reactions

DELETED Experimental investigation involving the interaction of fast neutrons with DELETED systems will be started when sufficient (several kilograms) Li^6 becomes available for this purpose.

E. High Temperature Research

Experimental measurements such as the measurement of opacity and observations of certain hydrodynamic effects may be made in connection with mock-up shots at the Nevada Proving Ground.

F. Application to Intermediate Range

Investigation of methods of using Li^6 in connection with producing highly efficient explosions of less than one megaton yield will be carried out. For example, the DELETED type of system in which Li^6 DELETED DELETED than as a thermonuclear fuel will be further investigated.

G. Special Primary

Development of a primary atomic bomb designed specifically for use in connection with the two-stage thermonuclear type weapon will be attempted.

VI. SMALL WEAPON RESEARCH

Investigation of the use of hydrides alone and in combination with metals in various geometries including guns (6" to 11" diameter), spheres (12" to 18" diameter), [redacted] has been recently started and will continue throughout this period. At present this research is proceeding on a rather broad front, but may be expected to narrow down to several specific possibilities during this time. Pin shot and X-ray photograph experiments using the equipment described in III-F above will be performed using dummy cores. Measurements of the critical masses of interesting combinations will also be made using the facilities described in III-C above.

[redacted]

VII. SPECIFIC WEAPONS ENGINEERING AND DEVELOPMENT (10%)

A. [redacted]
B. DELETED

These devices are now being designed as extensions of the [redacted] into a larger [redacted] and a smaller [redacted] yield range. (Reference CXXII-9 and BY-1903) They are intended as weapon prototypes and will be provided with ballistic cases and timing and firing systems by the Sandia Corporation. The first version of [redacted] will weigh in its air drop form about 19,000 pounds. Further development on a case and on the use of a special primary should bring this weight down to 15,000 pounds. Likewise, the [redacted] in its first air drop form will weigh between 6,000 and 7,000 pounds. Further development on its case and the use of special primary should bring the weight down to about 3,000 pounds.

[redacted] is tentatively scheduled for completion at about the end of Calendar 1954 and [redacted] is tentatively scheduled for completion about the middle of calendar 1955.

C. Special Primary

The development of special primary bomb specifically for use in connection with two-stage thermonuclear weapons should lead to a considerable reduction in the weight of such devices. Several ideas have been suggested and will be further investigated theoretically. It is hoped that it will be possible to test fire such a device in Operation Teapot.

D. Small Spherical Bomb
E. Gun [DELETED]

Engineering has begun on these devices. They are tentatively scheduled for completion in time for testing during Operation Teapot and are described above under VI.

VIII. LARGE SCALE TEST PARTICIPATION (20%)

A. Castle

UCRL participation in Operation Castle involves the firing of the [DELETED] (V-A and B) and the performing of a number of diagnostic experiments in connection with these two shots: Ganex, Tenex, Alpha of primary, Radiochemistry, Phonex, Fast Photography. In addition, UCRL is performing the Ganex, Tenex, and Alpha measurements for the LASL [DELETED] shot.

B. Teapot

UCRL participation in this operation is not yet frozen. Tentative plans are to make three shots in connection with the small weapons program (possibly two spherical implosions and one shot of either gun type or [DELETED] type), one or two shots of thermonuclear mock-ups (similar to the [DELETED] of Operation Upshot), and one shot of the special primary discussed in VII-C above. Various diagnostic experiments will be performed.

IX. SMALL SCALE TEST PARTICIPATION (5%)

A. QAD

UCRL is proposing to test the [DELETED] (VII-B) in a very small and simple Pacific operation (Reference: See BY-1902). It is proposed that these weapons be air dropped and that diagnostic experiments consist of either fireball measurement or bhangmeter measurement of yield, plus radiochemical tracer experiments.

B. Small Weapons Test Shots

UCRL has at present no definite plans for making test shots of small weapons except in Operation Teapot; however, it may be advisable in connection

with the small weapon program to make independent small scale operations involving perhaps only one shot each at the Nevada Proving Ground.

Yours very truly,

Herbert F. York

HERBERT F. YORK

HFY:emc

ORIGINAL SIGNED BY
E. O. LAWRENCE

Approved by Ernest O. Lawrence

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